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VASCULAR TECHNOLOGY
PROFESSIONAL PERFORMANCE GUIDELINES

Lower Extremity Venous Insufficiency Evaluation

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Lower Extremity Venous Insufficiency Evaluation

PURPOSE

To evaluate the deep and superficial venous systems, including perforators, for evidence of valvular incompetence.

COMMON INDICATIONS

Common indications for the performance of lower extremity venous reflux evaluation include, but are not limited to:

- Stasis dermatitis or pigmentation
- Venous stasis ulcers
- Recurrent swelling of the lower calf and ankle
- Pain or feelings of heaviness in the lower extremity
- Visible varicose veins
- Venous claudication
- Pain and edema of the lower extremities
- Preoperative evaluation for venous insufficiency

CONTRAINDICATIONS AND LIMITATIONS

Contraindications for lower extremity venous insufficiency evaluation are unlikely; however, some limitations exist and may include the following:

- Obesity
- Open draining ulcers
- Severe edema and/or pain of the lower extremity
- Inability to stand for an extended length of time

GUIDELINE 1: PATIENT COMMUNICATIONS

The technologist/sonographer/examiner should:

1.1 Introduce yourself to the patient and explain why the evaluation is being performed and indicate how much time the examination will take.

1.2 Explain the procedure, taking into consideration the age and mental status of the patient and ensuring that the necessity for each portion of the evaluation is clearly understood.

1.3 Respond to questions and concerns about any aspect of the Lower Extremity Venous Insufficiency Evaluation.

1.4 Educate patients about risk factors for, and symptoms of, lower extremity venous insufficiency

1.5 Refer specific diagnostic, treatment or prognostic questions to the patient's physician.

GUIDELINE 2: PATIENT ASSESSMENT AND PHYSICAL EXAMINATION

Patient assessment must be performed before the evaluation. This includes assessment of the patient's ability to tolerate the procedure and an evaluation of any contraindications or limitations that may apply to the performance of the procedure.

The technologist/sonographer/examiner should:

2.1 Obtain a complete, pertinent history by interview of the patient or patient's representative and review of the patient's medical record, when available. A pertinent history includes:

a. risk factors for lower extremity venous insufficiency, previous deep vein and/or superficial vein thrombosis (DVT/SVT), lower extremity trauma, history of venous ulcers and/or varicosities, and family history of varicose veins.

b. current medications or therapies regarding the lower extremity venous complaints

c. results of other relevant diagnostic procedures

2.2 Complete a limited or focused physical exam, which includes observation and localization of the presence of any signs or symptoms of peripheral venous disease: swelling, pain, tenderness, discoloration, varicosities, and ulceration.

2.3 When directed, perform adjunctive procedures: lower extremity limb diameter measurements; palpation of pedal pulses.

2.4 Verify that the requested procedure correlates with the patient's clinical presentation.

GUIDELINE 3: EXAMINATION GUIDELINES

3A. DIRECT TESTING: DUPLEX EVALUATION FOR VENOUS REFLUX

Throughout each exam, sonographic characteristics of normal and abnormal tissues, structures, and blood flow must be observed so that scanning technique can be adjusted as necessary to optimize image quality and spectral waveform characteristics. The patient's physical and mental status is assessed and monitored during the examination, with modifications made to the procedure plan according to changes in the patient's clinical status during the procedure. Also, sonographic findings are analyzed throughout the course of the examination to ensure that sufficient data is provided to the physician to direct patient management and render a final diagnosis.

a. A standard modified examination is performed to rule out the presence of a deep vein thrombosis by evaluating the common femoral, proximal saphenous (great saphenous), femoral (femoral vein in the thigh) and popliteal veins, as well as the posterior tibial and peroneal veins at the level of the ankle, for normal compression and

normal Doppler spectral waveform characteristics as per the SVU Professional Guideline for Lower Extremity Venous Evaluation for Deep Vein Thrombosis.

b. Chronic deep venous obstructions, recanalization, collateralization, and incompetent perforator locations should be noted on the technologist's worksheet. If no evidence of acute DVT is noted, proceed to the protocol below to evaluate for venous insufficiency.
c. If chronic changes in the deep or superficial system are identified, the location and severity must be noted and reported to the referring physician.
d. The position for lower extremity duplex evaluation for venous reflux is with the legs in a dependent position, either by having the patient lying supine in the reverse Trendelenberg position (feet 15-20 degrees lower than the heart) or standing.
e. In the standing position, the patient is asked to face the sonographer with the leg to be examined rotated slightly externally. The patient is asked to put most of his/her weight on the opposite leg
f. The patient may stand on a platform with a support bar so that they are at a height such that the sonographer can comfortably interrogate the limb from the groin to the ankle. So that an ergonomically correct position is maintained, the sonographer may sit on an adjustable chair. Alternately, for scanning below the knee, the patient may be seated on a height adjustable chair or the exam table, with the examiner seated below with the limb to be examined resting on the examiner's knee. A combination of sitting and standing can be used depending on the patient's physical condition.

3.A.1 Use appropriate duplex instrumentation, which includes display of both two-dimensional structure and motion in real-time, color flow imaging capabilities, and Doppler ultrasonic signal documentation with:
   a. Doppler spectral analysis
   b. imaging carrier frequency from 5.0 MHz to 3.0 MHz
   c. videotape, film or digital storage of static images and/or cineloop
   d. an automatic cuff inflation system or manual "quick release" valve plus a wide bore, 17cm wide cuff may be useful. This simplifies the exam and standardizes the results.

3.A.2 Follow a standard exam protocol. Studies may be unilateral or bilateral.
   a. A complete venous duplex reflux evaluation incorporates both B-mode imaging and Doppler spectral analysis (if duration of flow reversal is the only measurement used, angle correction is not necessary), complemented with color flow imaging, as indicated. If flow rates or velocities are measured, angle correction must be used with the angle kept at or below 60 degrees
   b. It may be necessary to have an assistant apply manual compression to the extremity distally, if an automatic cuff inflation device is not employed.
   c. The common femoral vein, proximal to the saphenofemoral junction, the saphenofemoral junction, the great saphenous vein, the femoral vein in the thigh, the popliteal vein (above and below the popliteal fossa), and the small saphenous vein - as well as perforating veins - are interrogated with duplex imaging. The thigh perforator should be looked for and suspected if a superficial vein is seen crossing the anterior thigh.
   d. The order of vessel assessment is dependent on patient positioning. It is important to identify the presence and define the location of perforating veins. Incompetence should be documented if found. Evaluation of the saphenofemoral junction can be performed in either the supine or standing position and is dependent on the patient's physical condition.
   e. The vein is first identified in the transverse plane.

3.A.3 Evaluation for Perforator Incompetence
   a. Identification of perforators is followed by evaluation for reflux and performed with the patient standing or sitting on the side of the exam table. The legs should be dependent for examination of the veins below the knee. Proximal or distal augmentation is performed with color and/or spectral Doppler

to evaluate for venous valvular reflux. The cuff method may be difficult below the knee due to size limitations. Perforators should be documented in all three chambers of the calf (anterior, posterior and lateral), if seen.

b. Mid thigh perforators should be searched for, particularly when varices are seen crossing the thigh.
c. Hard copy documentation of the presence or absence of reflux should be obtained.

3B. INDIRECT TESTING: PHYSIOLOGIC EVALUATION FOR VENOUS REFLUX

This section has been deleted as it is no longer considered a primary diagnostic method for diagnosing venous insufficiency.

GUIDELINE 4: REVIEW OF THE DIAGNOSTIC EXAM FINDINGS

4.1 Review data acquired during the Lower Extremity Venous Reflux Evaluation to ensure that a complete and comprehensive evaluation has been performed and documented.

4.2 Explain and document any exceptions to the routine Lower Extremity Venous Reflux Evaluation protocol (i.e., study omissions or revisions).

4.3 To determine any change in follow-up studies, review previous exam documentation so that the current evaluation can document any change in status. The examination protocol may need to be modified to address current physical needs.

4.4 Record all technical findings required to complete the final diagnosis on a worksheet by using other appropriate methods i.e., computer software, so that the findings can be classified according to the laboratory diagnostic criteria. These criteria must be based on published or internally validated data (see appendix).

4.5 Document exam date, clinical indication(s), technologist performing the evaluation and exam summary in a laboratory logbook or by other appropriate method, (i.e. computer software).

GUIDELINE 5: PRESENTATION OF EXAM FINDINGS

5.1 Provide preliminary results when necessary, as provided for by internal guidelines based on the Lower Extremity Venous Reflux Evaluation findings.

5.2.1 Present record of diagnostic images, data, explanations, and technical worksheet to the interpreting physician for use in rendering a diagnosis and for archival purposes.

5.2 Alert vascular laboratory Medical Director or appropriate health care provider when immediate medical attention is indicated based on the Lower Extremity Venous Reflux Evaluation findings.

GUIDELINE 6: EXAM TIME RECOMMENDATIONS

High quality, accurate results are fundamental elements of the lower extremity venous reflux evaluation. A combination of indirect (visual examination of the patient) and direct exam components is the foundation for maximizing exam quality and accuracy. Total recommended time allotment (Indirect AND Direct Components) is 75 minutes (for bilateral examination).

6.1 Indirect exam components include pre-exam activities: obtaining previous exam data; initiating exam worksheet and paperwork; equipment and exam room preparation; patient assessment (visually) and positioning (Guideline 1); patient communication (Guideline 2); post-exam activities: exam room cleanup; compiling, reviewing and processing exam data for preliminary and/or formal interpretation (Guidelines 4-5); and patient charge and billing activities. Recommended time allotment is 30 minutes.

6.2 Direct exam components includes equipment optimization and the actual hands-on, examination process (Guideline 3). Recommended time allotment is 35-45 minutes (for bilateral examination).

GUIDELINE 7: CONTINUING PROFESSIONAL EDUCATION

Certification is considered the standard of practice in vascular technology. It demonstrates an individual's competence to perform vascular technology at the entry level. After achieving certification from either ARDMS (RVT credential) or CCI (RVS credential), the individual must keep current with:

- advances in diagnosis and treatment of venous disease
- changes in Lower Extremity Venous Reflux Evaluation protocols or published laboratory diagnostic criteria
- advances in ultrasound technology used for the Lower Extremity Venous Reflux Evaluation
- advances in other technology used for the Lower Extremity Venous Reflux Evaluation.

APPENDIX

It is recommended that published or internally generated diagnostic criteria should be validated for each ultrasound system used. When validating diagnostic criteria for sonographic examinations, it is important to realize that equipment, operator and interpretation variability are inherent to this process.

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